

WHAT IS CLAIMED IS:

1. The use of a block copolymer, at least one block of which comprises phosphate functional groups and/or phosphonate functional groups, said  
5 copolymer optionally being dissolved in a solvent, such as an organic solvent, water or a water/alcohol mixture, as additive in a film-forming composition, to provide or promote the adhesion of said composition to  
10 a metal surface.

2. The use of a block copolymer, at least one block of which comprises phosphate functional groups and/or phosphonate functional groups, said  
15 copolymer optionally being dissolved in a solvent, such as an organic solvent, water or a water/alcohol mixture, as additive in a film-forming composition, to protect said metal surface from corrosion.

3. The use as claimed in claim 1 or 2, characterized in that the metal surface is a surface  
20 based on an element of the Periodic Table of the Elements chosen from the group of the alkali metals or alkaline earth metals, the transition metals, aluminum, gallium, indium, thallium, silicon, germanium, tin, lead, arsenic, antimony, bismuth, tellurium, polonium  
25 or astatine, and their oxides or their alloys.

4. The use as claimed in any one of claims 1 to 3, characterized in that the metal surface

is a surface based on aluminum, duralumin, zinc, tin, copper, copper alloys, such as bronze or brass, iron, steel, optionally stainless or galvanized, silver or vermeil.

5           5. The use as claimed in any one of claims 1 to 4, characterized in that the block comprising phosphate and/or phosphonate functional groups is a homopolymer based on a monomer comprising phosphate or phosphonate functional groups.

10           6. The use as claimed in any one of claims 1 to 4, characterized in that the block comprising phosphate and/or phosphonate functional groups is a random polymer based on at least one monomer comprising one or other of these phosphate or  
15 phosphonate functional groups or their mixtures in an amount of between 0.1 and 100% by weight of said monomers with respect to the total weight of the block.

          7. The use as claimed in claim 6, characterized in that the amount of said monomers is  
20 between 0.5% and 50% by weight of said monomers with respect to the total weight of the block.

          8. The use as claimed in either one of claims 6 and 7, characterized in that the amount of said monomers is between 2% and 20% by weight of said  
25 monomers with respect to the total weight of the block.

          9. The use as claimed in any one of claims 5 to 8, characterized in that the proportion by

mass of the anchoring block with respect to the total weight of the block copolymer of the present invention varies between 90:10 and 10:90.

10. The use as claimed in any one of
- 5 claims 5 to 9, characterized in that the monomer comprising phosphate or phosphonate functional groups is chosen from:
- N-methacrylamidomethylphosphonic acid ester derivatives, in particular the n-propyl ester (RN 31857-11-1), the methyl ester (RN 31857-12-2), the ethyl ester (RN 31857-13-3), the n-butyl ester (RN 31857-14-4) or the isopropyl ester (RN 51239-00-0), and their phosphonic monoacid and diacid derivatives, such as N-methacrylamidomethylphosphonic diacid (RN 109421-20-7),
  - 15 - N-methacrylamidoethylphosphonic acid ester derivatives, such as N-methacrylamidoethylphosphonic acid dimethyl ester (RN 266356-40-5) or N-methacrylamidoethylphosphonic acid di(2-butyl-3,3-dimethyl) ester (RN 266356-45-0), and their phosphonic monoacid and diacid derivatives, such as N-methacrylamidoethylphosphonic diacid (RN 80730-17-2),
  - N-acrylamidomethylphosphonic acid ester derivatives, such as N-acrylamidomethylphosphonic acid dimethyl ester (RN 24610-95-5), N-acrylamidomethylphosphonic acid diethyl ester (RN 24610-96-6) or bis(2-chloro-
  - 25

- propyl) N-acrylamidomethylphosphonate (RN 50283-36-8), and their phosphonic monoacid and diacid derivatives, such as N-acrylamidomethylphosphonic acid (RN 151752-38-4),
- 5 - the vinylbenzylphosphonate dialkyl ester derivatives, in particular the di(n-propyl) (RN 60181-26-2), di(isopropyl) (RN 159358-34-6), diethyl (RN 726-61-4), dimethyl (RN 266356-24-5), di(2-butyl-3,3-dimethyl) (RN 266356-29-0) and di(t-butyl) (RN 159358-33-5) ester derivatives, and their phosphonic
- 10 monoacid and diacid alternative forms, such as vinylbenzylphosphonic diacid (RN 53459-43-1),
- diethyl 2-(4-vinylphenyl)ethanephosphonate (RN 61737-88-0),
- 15 - dialkylphosphonoalkyl acrylate and methacrylate derivatives, such as 2-(acryloyloxy)ethylphosphonic acid dimethyl ester (RN 54731-78-1) and 2-(methacryloyloxy)ethylphosphonic acid dimethyl ester (RN 22432-83-3), 2-(methacryloyloxy)methylphosphonic acid
- 20 diethyl ester (RN 60161-88-8), 2-(methacryloyloxy)-methylphosphonic acid dimethyl ester (RN 63411-25-6), 2-(methacryloyloxy)propylphosphonic acid dimethyl ester (RN 252210-28-9), 2-(acryloyloxy)methylphosphonic acid diisopropyl ester (RN 51238-98-3) or
- 25 2-(acryloyloxy)ethylphosphonic acid diethyl ester (RN 20903-86-0), and their phosphonic monoacid and diacid alternative forms, such as 2-(methacryloyloxy)ethyl-

- phosphonic acid (RN 80730-17-2), 2-(methacryloyloxy)-methylphosphonic acid (RN 87243-97-8), 2-(methacryloyloxy)propylphosphonic acid (RN 252210-30-3), 2-(acryloyloxy)propylphosphonic acid (RN 254103-47-4) and 2-(acryloyloxy)ethylphosphonic acid,
- vinylphosphonic acid, optionally substituted by cyano, phenyl, ester or acetate groups, vinylidene-phosphonic acid, in the sodium salt form or the form of its isopropyl ester, or bis(2-chloroethyl)vinyl-phosphonate;
- and their phosphate analogs, and
- acrylates or methacrylates of polyethylene glycol omega phosphates or acrylates or methacrylates of polypropylene glycol omega phosphates.

11. The use as claimed in one of claims 1 to 10, characterized in that the block copolymer employed is obtained as the result of a controlled radical polymerization process preferably using, as control agent, one or more compounds chosen from dithioesters, thioethers-thiones, dithiocarbamates and xanthates, said polymerization being carried out in particular under bulk conditions, in a solvent or in an aqueous emulsion, so as to directly obtain the copolymer in the form of an aqueous or aqueous/alcoholic solution.

12. The use as claimed in claim 11, characterized in that the concentration of block copolymer in the film-forming composition is between

0.001 and 20% by mass with respect to the total mass of the solids content of the film-forming composition.

13. The use as claimed in claim 12, characterized in that the concentration of block  
5 copolymer in the film-forming composition is between 0.005 and 10% by mass with respect to the total mass of the solids content of the film-forming composition.

14. The use as claimed in claim 13, characterized in that the concentration of block  
10 copolymer in the film-forming composition is between 0.01 and 5% by mass with respect to the total mass of the solids content of the film-forming composition.

15. An aqueous film-forming composition, comprising a block copolymer as defined in any one of  
15 claims 5 to 14.

16. The composition as claimed in claim 15, characterized in that the composition is an optionally silicone-comprising mastic composition, paint composition or adhesive composition.